Integral approach of consumption and drug administration in a Mexican pediatric population

Luis Jasso-Gutiérrez

Abstract

Background. In the absence of a comprehensive analysis of the pediatric age population, a classification is proposed that analyzes the use or administration of drugs in three stages: (1) intrauterine, (2) newborn to school-age and (3) adolescence, with special emphasis on the Mexican population.

Methods. Information was searched for in Medline, Pub Med, Embase, Inbiomed, Lilacs, and Artemisa.

Results. Stage 1 describes the effects of maternal drugs on the fetus such as fetal death, withdrawal syndrome, prematurity, and learning disorders. Stage 2 reports the damage due to the administration by the parents of over-the-counter (OTC) medications such as opioids, dextromethorphan, or psychostimulants. Stage 3 emphasizes that drug use among adolescents has increased in recent years and is accentuated in older ages. In 2008 it was reported as 5.7%, with marijuana, cocaine, inhalants and heroin being dominant.

Conclusions. We propose to conduct a national survey in Mexico that includes the three stages, extending the investigation of stage 3 by 7 years to 21 years. Simultaneously, a national outreach and educational program should be established, enabling an intelligent and permanent impact on the population as a whole.

Key words: drug use in children, drug use in adolescents, three stages of drug use in children.

Introduction

In order to delimit concepts that will be used later on this study, we would like to introduce the definition of drug according to the World Health Organization (WHO) as “any psychoactive substance which is able to modify perception, mood, cognition, behavior or motor functions when inside the human body”. This includes alcohol, tobacco and solvents and excludes medications without psychoactive effects. The United Nations (UN) does not provide a distinction between legal or illegal drugs and only classifies their usage as such. However, the term “illegal drug” refers to those substances under international control that may even have a legitimate medical use but are produced, trafficked and/or consumed outside legal parameters. Alcohol and tobacco are regarded as substances by UN and WHO instead of drugs because they are not subject to international political control; however, they produce the highest rate of health problems worldwide because of their addictive properties. WHO uses the term “drug abuse” in order to be consistent with terms used by Conventions that indistinctly use the terms drug abuse, inappropriate use or illegal use.1

Although there are several studies in the literature regarding drug use and drug abuse in adolescents and adults, we were unable to find a study where an integral analysis on drug administration
or drug abuse considered the pediatric population as a whole. Therefore, this study proposes a classification that, even though arbitrary, is based on an epidemiological approach analyzing how the drug reaches the child, either if it was administered (i.e., during pregnancy, or by parents) or if it is consumed voluntarily. We classify the pediatric population according to three age stages:

- **Stage 1: Intrauterine stage**
- **Stage 2: Neonatal–school-age stage**
- **Stage 3. Adolescence stage**

In stage 1 (fetal stage), the unborn fetus may be exposed to drugs, tobacco or alcohol if the mother ingests any of these substances during pregnancy. The mother may also consume illegal drugs or use over-the-counter (OTC) medications as a recreational drug.

In stage 2 (from newborn to school-age), drugs reach the child because parents administer certain medications to treat common diseases such as common flu, bronchitis or attention-deficit disorders. These substances may produce different effects from moderate to severe with fatal consequences. Children attending school seem to share epidemiological behaviors with adolescents (stage 3). Although it is possible that the percentage and incidence of substance abuse such as alcohol and tobacco is lower than that observed in adolescents, there are reports where drug abuse is confirmed in children. Therefore, we present the available information reported in the literature for each stage on penetration, consequences, and behavioral changes and we suggest some strategies to reduce the impact drugs have during different pediatric ages.

**Methods**

We carried out an investigation searching for different terms in the most common scientific databases such as Medline, Pub Med, Embase, abstracts, conference and symposia proceedings in English and in Latin-American indexes such as Inbiomed, Lilacs, and Artemisa in Spanish. We also used the Google search engine both in English and Spanish. Initial search focused on experiences observed in Mexico for each of the aforementioned stages. When there was scarce or null information, we selected international studies. We preferred reports published within the last 5 years, with some exceptions.

**Results**

**Stage 1: Intra-uterine stage**

Fetuses and newborns are more susceptible to suffer from toxic effects from substances that cross the placental barrier such as drugs, medications, environment pollutants and endogenous substances because of the immaturity on their assimilation and excretion systems. This produces high concentrations of substances over prolonged periods of time. Presence of these substances may lead to premature births, intrauterine malnutrition, neonatal abstinence syndrome (NAS), and congenital malformations as well as learning and behavioral problems and increases the risk of experiencing child abuse.

In our review we found no information in Mexico about drug abuse during pregnancy and the effects on the fetus in the short and long terms, except for some cases of fetal alcohol syndrome (FAS) and smoking effects such as low birth weight. Therefore, this section contains only information obtained from international experiences. A report published in 1992 and 1993 shows that in the
Marijuana is the most frequently used drug among women during their reproductive age in the U.S. Some studies suggest its use during pregnancy can impact fetal development and increase the risk of premature childbirth. These effects are generally more prevalent among women who consume marijuana at least six times per week. After birth, some newborns exposed in utero to marijuana experience signs similar to NAS such as excessive crying and tremors.\textsuperscript{5,6}

The use of ecstasy, methamphetamines and other amphetamines has increased in the U.S. in recent years. There are few studies on the effects of ecstasy on the fetus; however, there are case reports of congenital cardiopathies or equinovarus foot associated with this drug. A recent study found children born to mothers who consumed methamphetamines presented three times the risk of stunted fetal development and a smaller cranial perimeter when compared to children born to non-exposed mothers. The risk of premature childbirth and placental problems is also increased, with reported cases of cardiopathies and cleft palate and lip; however, the actual mechanism associated with this drug is still unknown. Some newborns present a syndrome similar to abstinence (NAS) after birth, which includes tremors, drowsiness and respiratory problems. Long-term consequences of exposure to ecstasy, methamphetamine and other amphetamines during pregnancy remain to be clarified. We are aware that newborns with low birth weight have a higher possibility of developing learning problems, although further studies are required to more precisely address this.\textsuperscript{7}

Heroin has been associated with a high risk for developing complications during pregnancy such as stunted fetal development, premature rupture of membranes, premature delivery and fetal death. Almost 50\% of children exposed to heroin during pregnancy present low birth weight, a high percentage of them are premature and frequently present respiratory problems and have a higher risk for developing long-term consequences. Use of heroine may produce congenital malformations, although its effects have not been clearly specified especially when used in combination with other drugs. NAS is very common among children exposed to heroin and symptom onset is during the first 3 days after birth. Symptoms include fever, sneezing, tremors, discomfort, diarrhea, vomiting, persistent crying and seizures. Generally, these symptoms persist for a week and their intensity has been associated with the mother’s consumption (time and dosages). The longer the exposure and higher dosages, the more intense will the NAS be. Heroin can be inhaled or smoked, and some users even inject it into their bodies increasing the risk of HIV and hepatitis C transmission. Pregnant women who use heroin should not suspend its use abruptly because this exposes the fetus to a higher risk of death. These women should attend a specialized center to receive methadone. Children born to mothers who received methadone also present abstinence syndrome symptoms that can be easily treated. In general, they have a higher weight at birth than children born to mothers who only used heroin.\textsuperscript{8}

The use of opioids related to morphine, pentazocine and anti-allergy drugs are frequently mixed and ingested by some pregnant women and may produce abstinence syndrome symptoms similar to those experienced with oxycodone.\textsuperscript{9}

Cocaine may affect a pregnant woman and her child in several ways: 1) by producing miscarriage during the first months, 2) premature delivery or 3) by inducing poor fetal development. The last two effects increase comorbidities in newborns that may generate mental disabilities such as mental retardation or cerebral palsy.\textsuperscript{10} The risk for presenting urinary tract malformation along with other malformations is also higher.\textsuperscript{11,12} In spite of the above, there are reports where children exposed to cocaine in utero present normal intelligence.
levels. They may present learning and behavioral challenges including language development delay and attention deficit and an evident developmental delay (low weight and height by 7 years of age). The effects of cocaine, methamphetamine and selective-serotonin reuptake inhibitors (used to help pregnant women with depression) have in common a monoaminergic transmission mechanism that may act as a stressing agent affecting fetal programming, the expression of fetoplacental monoamine transporters and neurotransmission systems. It is worth noting that fluoxetine used for depression during pregnancy produces clinical manifestations in 30% of newborns including gastrointestinal, somatic and respiratory symptoms such as pulmonary hypertension, which has been reproduced in animal experiments.

Other drugs such as lysergic acid diethylamide (LSD), phencyclidine and ketamine may also produce NAS and produce a higher risk for developing learning and behavioral problems. Inhalants may produce miscarriages, premature deliveries, malformations, intrauterine malnutrition and NAS at birth.

Long-term effects of smoking during pregnancy have been recently described and include language problems, discomfort and hypertonicity, attention deficit during early childhood and attention deficit with hyperkinesis in adolescents, modulation of brain cortex and substantia alba as well as nicotine addiction.

Alcoholism effects are well exemplified by FAS. A recent and multi-referenced review described 37% of FAS children were premature, 64% had low birth weight, 94% were exposed to high alcohol dosages during pregnancy and 78% were also exposed to at least another drug. Of these children, only 6.5% were diagnosed at birth and 63% were diagnosed at 5 years of age, 56% presented developmental alterations, 53.2% had microcephaly, 85.9% had central nervous system dysfunction, 24% presented other birth defects, 5.4% had neurosensory hearing loss and 4.3% had vision compromise.

A study was carried out in Mexico City where 200 women were interviewed after asking for help with their alcohol habits. The study identified that 134 women were pregnant at some point. Of these women, 57.5% consumed alcohol during pregnancy, 12% presented miscarriages, 13.7% premature delivery, 5.5% fetal death, 6.8% congenital anomalies and 13.7% of their babies presented low birth weight. Alcohol ingestion during pregnancy increased the risk of premature delivery by 7.9 times and the risk for children consuming alcohol later on their lives by 2.1%. Dependence severity increased the risk of having low birth weight children (OR = 3.7) as well as the later development of consumption problems (OR = 2.7). Similarly, consuming alcohol on a daily or almost daily basis increased the risk that children developed alcohol ingestion problems (OR = 2.9).

Stage 2: Neonatal to school-age stage
The use of some prescription and OTC medications to treat common colds and cough has gained popularity among adolescents as recreational drugs. This is regarded as a growing epidemic in the U.S., including not only adolescents but nursing infants and preschool and elementary school children. In these cases parents propitiately consume by administering medications without prescription for common cold or cough. Studies carried out by the U.S. Poison Control Centers have demonstrated a significant increase of non-medical use for these medications, especially those containing dextromethorphan (DXM). Use of these medications higher than the recommended dosages produces severe clinical effects that may threaten life, cause dependency or even abstinence syndrome symptoms. DXM may produce mental status alterations and contribute to judgment failure, which may lead to accidents or even death. The combined ingestion with
other OTC medications may increase morbidity and propitiate the abuse of alcohol and other substances.27 Recent studies have demonstrated the scarce or null effectiveness of these medications for common cold or cough, whereas they are prejudicial for children.28 Between 2004 and 2005, 1,500 children were admitted to emergency departments because of adverse effects associated with medications used to treat common cold or cough. Three of these children died. The risk of overdose, incorrect dosage and adverse events has increased in nursing infants because children in this age group tend to more frequently present upper airway infections.29 A prospective study evaluated parents’ understanding of indications printed in OTC medications regarding administration warnings or cautions. Of parents, 87% thought after reading the label that the medication should be administered to children <2 years of age, 50% manifested it could be administered to children <13 months old. Misinterpretation on the part of parents is associated mainly with language and graphics used in dosage labels by pharmaceutical companies. We should also consider parents’ low educational levels and limited skills.30 A toxicology center in the U.S. evaluated the trend of OTC medication abuse in school-age children and adolescents during a 10-year period. This study documented 2,214 cases of intentional medication abuse among school-age children and adolescents. Of these cases, 38% were associated with OTC medications, 65% were exposed to the medication at home and 10% were exposed at school. Of exposed children, 68% had to be admitted to a medical unit. The most frequently used medications were anticholinergic drugs, caffeine, DXM and freely available stimulants.31

There is no precise information about the impact of opioids in U.S. children; therefore, a review was carried out by the Research Abuse, Diversion and Addiction-Related Surveillance (RADARS) System between January 2003 and June 2006. This review analyzed the impact of the following drugs in children <6 years-old: buprenorphine, fentanyl, hydrocodone, hydromorphone, methadone, morphine and oxycodone.32 The study found that a total of 9,179 children were exposed to opioids. The average age of exposure was 2 years old, ranging from newborns to 5.5-year-old children. Of the cases, 99% were associated with ingestion and of these 90% occurred at home. There were eight deaths, 43 children presented significant sequelae and 214 had moderate sequelae. Of children who presented significant sequelae or even died, 34 responded positively when treated with naloxone. Most children exposed to these medications received them from adults at home.28 Psychostimulant drugs may induce adverse psychiatric reactions in children under treatment for attention-deficit disorder. These reactions include visual and tactile hallucinations involving insects, snakes or worms.33

Stage 3: Adolescence stage
Mexican information sources regarding the use and abuse of drugs and medications during adolescence are numerous and transcendent, having an important presence in the international context. Because of their narrative, results and conclusions there is little room for expansion; therefore, we present some of the most useful sources used in the present study. We selected some of their findings in order to highlight the importance of drug abuse during this stage in Mexico.

Surveys Applied Jointly by the Ministry of Education (SEP) and the Mexican Institute of Psychiatry34 (Instituto Nacional de Psiquiatria Ramon de la Fuente Muniz, INP)
Since 1976, SEP and INP have carried out epidemic studies on the use of addictive substances in junior- and senior-high-school populations without considering a non-student population. This includes all institutions where young persons between 12 and 19 years old are studying. The purpose of these surveys is to determine the
prevalence of substance abuse and the affected population groups as well as to provide a basis for the development and evaluation of prevention programs. National surveys have been carried out in 1976, 1986, 1991 and 1997; additional surveys have been carried out in Mexico City every 2 to 3 years between 1976 and 1997, including the most recent survey carried out in 2009.35

We selected some examples of results published in Mexico expressed in graphics that show student behaviors during certain years. Figure 1 shows that starting from 1976 there is a progressive increment of “sometime in life” drug consumption until 1997. This trend is repeated with the use of marijuana and cocaine and the trend is negative on the use of inhalants.34 Figure 2 shows an increasing trend on the use of marijuana and cocaine when evaluating the “previous year” category and this trend repeats in the “previous month” evaluation as shown in Figure 3. This category presents a significant decrease on the use of hallucinogenic drugs in 1997 compared with figures reported in 1993 and 1989. It is important to highlight that a positive answer to the “previous month” consumption question may indicate frequent substance consumption. Figure 4 shows a progressive use of marijuana as the adolescent grows older, be-

Figure 1. “Sometime in life” percentage of drug use in Mexico City students.

Figure 2. “Last year” percentage of drug use in Mexico City students.

Figure 3. “Last month” percentage of drug use in Mexico City students.
between 1989 and 1997. This phenomenon is also observed with the use of other drugs.

A recent study with a design comparable to the aforementioned surveys was carried out in 2006 by INP and published in 2009. This study included 10,523 students from Mexico City randomly selected to ensure even distribution by political district and educational level. This survey found that tobacco consumption “sometime in life” affected males and females alike, which was the same result as described in 2003. Of female adolescents, 68.8% consumed alcohol “sometime in life” and 41.3% consumed alcohol during the “previous month”. Total prevalence of drug consumption was 17.8%, which is 2.6% higher than results obtained in 2003. Males were among the most affected group by actual consumption than females. As for educational level, substance abuse was almost 2-fold higher among senior high-school female students compared with junior high-school female students. Consumption of illegal drugs was lower in females; however, this group presented an important increase in consumption of inhalants and marijuana, and cocaine consumption remained even. Regarding substances, marijuana was the preferred drug among female teenagers followed by inhalants, tranquilizers and cocaine. Authors conclude illegal drug consumption increased from 15.2% to 17.8% with an accentuated increment in the use of marijuana and inhalants, whereas tranquilizers maintained a stable consumption and cocaine consumption decreased. Districts most affected in Mexico City by illegal drug consumption were Azcapotzalco, Cuauhtemoc, Benito Juarez, Coyocan and Tlalpan, leaving the following in second place: Gustavo A Madero, Venustiano Carranza, Iztacalco and Miguel Hidalgo. When authors analyzed the relationship between illegal drug consumption with other problematic behaviors, they identified that illegal drug users presented depression, suicidal attempts, and antisocial behavior as well as attention-deficit disorders two or three times more frequently than adolescents who did not use illegal drugs.

Surveys applied by the drug information reporting system (SRID)

Surveys by SRID are applied at care centers for drug-addicted patients. They allow making an updated biannual diagnosis on substance use in Mexico City. They began the surveys in 1986 and their data are gathered from 45 health and judicial institutions in Mexico City that apply the survey voluntarily. Persons who recognize themselves as substance users complete the “Personal Report on Drug Use” in June and November of each year. Gathered data are processed, analyzed and summarized by the National Institute of Psychiatry who publish a report with the results. SRID “cases” include anyone who confirms having used a substance at least once in their lifetime. As for medical substances, a “case” includes anyone who has used a medication without prescription with the deliberate intention of becoming intoxicated.

We include three figures created for the present study that were illustrative regarding the
use of drugs in the “previous month.” Although figures about consumption “once” or “in the last year” are not mentioned, they are equally important; however, they were not included in the present study because of space limitations. Figure 5 shows an increment in the use of inhalants, non-medical substances, alcohol, and tobacco in 2008 compared with 2006 in the 12- to 14-year-old population as consumption increased from 30% to 60% with inhalants, from 10% to 30% with non-medical substances and from 5% to 10% with alcohol and tobacco. This situation changes dramatically when evaluating the population of 15- to 19-years of age (Figure 6) where there is a high increment on the use of drugs such as hallucinogens, amphetamines and cocaine, revealing an accented increase between 2006 and 2008 figures.

---

**Figure 5.** “Last month” percentage of drug use in students between 12- and 14-years-old in 2006 and 2008.

**Figure 6.** “Last month” percentage of drug use in students between 15- and 19-years-old in 2006 and 2008.
Figure 7 shows trends from 1987 to 2008 on the “previous month” use of three drugs. We can observe that the use of cocaine has shown a progressive increment since 1987, followed by stabilizing periods between 1999 and 2003, then a decrement and a new increment in 2006. Regarding inhalants, these show a decreasing trend starting in 1999, which is similar to that observed for marijuana.

Surveys applied to street children
Official statistics estimate there are 13,000–15,000 children living in the streets semi-permanently in Mexico City and a high percentage of these children consume drugs occasionally or habitually. Inhalants have a higher prevalence, although the use of marijuana and cocaine has been documented. A study on the abuse of addictive substances was carried out in 1998 by the Family Integral Development (DIF), UNICEF and INP. It included children and adolescents from 100 cities in Mexico who participated in an economic activity on the streets or in public spaces. The study found 72% were boys and 28% were girls. Of the children, 26% were between 6 and 11 years old with an average age of 13 years old. Sixty-five percent of children were registered at school. Of these children, 42% were at least two levels below the actual level they should be according to their age. Of working children, 2/100 lived on the streets. Ninety-five percent lived in a house and 90% were living with their relatives. Of these children, 7.5% of males and 2% of females had tried drugs, excluding tobacco and alcohol. The most frequently used drugs were inhalants and marijuana with a lower presence of cocaine and psychotropic drugs. The problem of children in the streets has been well identified in Mexico, and reasons have been explained for why remediation programs have failed and the consequences of drug addiction in this population.

National addiction surveys on addictions carried out by the Secretary of Health
To date, five National Surveys on Addictions (NSA) have been carried out in 1988, 1993, 1998, 2002 and 2008. The first three surveys reported urban data and the fourth survey included rural data. The first four surveys had a national representation and regional data were obtained from their results (north, south and central). The 2008 NSA also included an urban/rural representation that allowed a breakdown analysis for different states. NSA-2008 was carried out in coordination with the Secretary of Health, the National Council against Addictions, the National Institute of Psychiatry “Ramon de la Fuente Muniz” and the National Institute of Public Health. The survey used a ran-
Integral approach of consumption and drug administration in a Mexican pediatric population

domized, probabilistic sample and multistage analysis including 50,688 homes throughout the country, with sufficient representation for each state. Information was obtained through a direct at-home interview with an adult between 18 and 65 years old and one adolescent between 12 and 17 years old. Here we describe some of the most relevant results obtained from NSA-2008 regarding adolescents. Because of the lack of specific information, we included certain pertinent results although they do not belong strictly to the adolescent group:

1) Tobacco consumption. Of adolescents, 8.7% had smoked at least once in their lives (even if only a “puff”). Average age for first consumption was 13.7 years old; 68.6% began consumption out of curiosity and 24.1% did it influenced by family, friends or colleagues; 2.5% had smoked >5 packs of cigarettes in their lifetime; 85.1% had not smoked; 8.8% were active smokers and 5.1% were ex-smokers. The aforementioned results were similar to those found in NSA-2002. Regarding the possibility for quitting smoking, 42.3% of adolescents tried to quit smoking. Of these adolescents, 49.9% tried to abruptly quit, 19.4% stopped buying cigarettes and 9.8% gradually reduced consumption, 0.6% had undergone some type of treatment to quit smoking and 52.2% of active smokers were aware of medications to help quit smoking.

2) Alcohol consumption. Data from NSA-2008 confirm observations from previous surveys. Beer is the most frequently consumed alcoholic beverage followed by liquor, wine and cocktails. The highest consumption rate occurred between 18 and 29 years old when compared with older persons. Of females, more adolescents (7.8%) than adults (3.9%) reported to have had problems with their family. Regarding previous NSAs, daily alcohol consumption remained an infrequent practice in our country, whereas heavy drinking occasionally is still common in Mexico. Survey reveals adolescents are using adults as role models models and a significant sector has problems with their drinking habits.

3) Drug consumption. Consumption prevalence of illegal drugs increased from 4.5% to 5.7% in the age group between 12 and 65 years when comparing results from NSA-2002 and NSA-2008, respectively. Illegal drugs included marijuana, cocaine, heroin, methamphetamines, hallucinogens and inhalants, among others. On the other hand, consumption of medications with addictive potential obtained without prescription remained at the same levels observed in NSA-2002.

Marijuana has been among the most frequently used drug among the population, whereas cocaine consumption has shown fluctuations as revealed by SNA-1988 through SNA-2008. Consumption of other drugs such as crack and methamphetamines has increased 6-fold; however, when compared to actual marijuana and cocaine consumption, their prevalence is much lower. Although there are no specific data for adolescents, SNA-2008 reveals persons between 12 and 65 years old considered marijuana as the most addictive drug (80.3%) followed by cocaine (75.8%) and alcohol (71.2%). Of male adolescents, 25.4% between 12 and 25 years old had the opportunity to use drugs. Among adolescents, being out of school was identified as an important risk factor to consume drugs as well as having a family member or friend who consumes them. Opportunities for using drugs were lower for the generation born between 1942 and 1956 (12.7%) compared with generations born between 1957 and 1971 (18.7%), between 1972 and 1983 (22.8%) and between 1984 and 1996 (17.3%).

There was a prevalence of 3.7% for children between 12 and 17 years old to become drug users according to consumption history found in a cohort study. Data from the survey also indicated that adolescents between 12 and 17 years old had a higher probability for using drugs when they had the opportunity, compared with adolescents > 18 years old. Also, they presented 69 times more probability of using marijuana when given the drug
for free than those adolescents who had not been exposed to drugs. Drug addiction development has a higher probability among adolescents between 12 and 17 years old (35.8%) than in young persons between 18 and 25 years old (24%) and in young adults >25 years old (14.5%). The first drug consumption before 18 years of age occurred in 63.3% of inhalant users, 55.7% of marijuana users, 50.9% of sedative users, 46.5% of methamphetamine users and 36.4% of cocaine users.

Results from SNA-2008 confirm that when alcohol and tobacco consumption start before 18 years of age, the probability to use other drugs increases. For instance, 14.2% of persons who smoked before 18 years old tried marijuana compared with 5.4% of those who smoked for the first time between 18 and 25 years old. Cocaine consumption rate was 7.6% vs. 3.8% and this trend is repeated for other drug consumption. Regarding alcohol consumption, 15.8% of those who tried it before 18 years old also tried other drugs. Results indicate a person is 4.5 times more likely to consume drugs if a family member uses them; however, the probability increases to 10.4 times if a drug is used by a best friend. Those who do not smoke or drink alcohol present a low prevalence on drug consumption (1.0% and 2.3%, respectively). Less than 7% of those who start smoking or drinking alcohol after 18 years of age use drugs. Programs that limit exposure of minors to tobacco and alcohol have an important impact on the prevention of drug consumption.

Experiences published in national and international journals on the use of drugs in Mexican children and adolescents

Children between 6 and 7 years of age in an elementary school in Celaya, Guanajuato were exposed to tobacco or alcohol by their parents: 77% of mothers and 25% of fathers smoked, whereas 25% of mothers and 48.6% of fathers consumed alcohol. Of these children, 37% had consumed beer at some time, 8.1% had smoked but none had consumed drugs. This finding was similar in the state of Morelos and states from northern Mexico. Adolescents in Monterrey had consumed alcohol, tobacco and marijuana once with a prevalence of 67%, 65% and 7%, respectively and had consumed these substances in the last month in 33%, 38% and 3% of cases, respectively. Of them, 65% reported that their friends had used these substances and 56% had consumed alcohol in the last month, 64% used tobacco and 51% used marijuana.

Based on the investigations of Medina-Mora regarding the use of drugs among adolescents in Mexico, we report the following conclusions including the fact that drug consumption among Mexican adolescents is lower than in developed countries. However, as a consequence of the progressive increment in drug consumption at those ages and a more even distribution ratio for males and females, we should take preventive measures in public health areas. Also, the probability of drinking alcohol regularly and developing a dependency is higher when first consumption is at an early age and decreases as first consumption occurs later in life. Using drugs, regular alcohol consumption and use of several substances at the same time are more frequent in those persons who started using them by the age of 15 years. Early consumption of tobacco increases the probability of substance use and abuse. We include a bibliography from Medina-Mora in the reference section for further information on drug abuse in adolescence.

After investigating and reviewing scientific and medical information on the use and administration of drugs in Mexico including their characteristics, potential and specific effects and the current status of preventive and treatment measures, we were able to identify that there is sufficient information regarding drug abuse during adolescence, whereas information on drug abuse during intrauterine, neonatal and school-age stages is practically nonexistent.
Therefore, during the intrauterine stage, information already presented was obtained mainly from international sources and indicates that it is difficult to identify actual effects of a given drug on the fetus because consumption of several substances by pregnant women reaches high percentages, at least in the U.S. and Europe. In spite of the above, we identified studies that demonstrate specific effects of certain drugs such as congenital malformations and NAS as well as mid- and long-term effects on child development. It is important to highlight that there are no reports in Mexico (either published nationally or in international journals) on the effects of drug consumption at birth, in the short-, mid- and long-term except for the identification of NAS and the impact of smoking on the birth weight of the newborn. Therefore, national surveys should include exploration of drug consumption during pregnancy and plan long-term follow-up of children born to mothers who consumed drugs during pregnancy. In the meantime, it is essential to implement educational programs in public health institutions to sensitize general physicians, family physicians and gynecologists regarding these matters. At the same time, physicians should receive training to actively research drug abuse by pregnant women and inform the mother about the risks and consequences for her and her baby.

As for the neonatal to school-age stage, we should be aware of the impact that certain OTC medications have, even though they are not regarded as drugs. Their free-access increases the probability of being administered by parents to their children without restriction. Despite good intentions of the parents, these medications present several collateral effects that may even threaten a child’s life. This occurs either because contraindications are not read or they are misinterpreted by parents, such as in opioid drugs or DXM, which are used to improve the child’s condition during a common cold or cough. It is important to highlight that in contrast with OTC medications, there are prescription medications (such as those used to treat attention-deficit or enuresis) whose administration should be closely observed because of their psychoactive properties. Again, we found no studies in Mexico aimed at identifying, evaluating and preventing the impact of such medications in our children. Therefore, it is essential to implement sensitization programs for general physicians, family physicians and pediatricians on the risks that these OTC medications represent for children. The next national survey should explore the magnitude of this behavior at home, identifying those OTC medications as well as prescription medications known to represent risks for children. It is difficult to imagine the impact on Mexican children from intrauterine to school-age stages compared with experiences observed in other countries. We should expect that they were of the same magnitude and, therefore, we reiterate the need to carry out further studies in Mexico.

Regarding adolescence, it is important to highlight that Mexico has made important advances in epidemiological research on addictions focused on this stage, ranging from understanding causes, types of drugs used, prevalence, trends and their impact on adolescent health. We may even consider that these investigations provide more information than those carried out in other countries. Surveys carried out at care centers for addicted persons have a biased sampling that influences interpretation of results because they are not focused on the pediatric population and do not include adolescents exposed to drugs.

Regarding surveys applied by SEP-INP to students as well as the most recent surveys, we should highlight they do not include adolescents who do not attend school and do not include children <12 years old where there is evidence of drug abuse beyond alcohol and tobacco consumption. In regard to surveys carried out on working children or street children, it may be more important to take actions to prevent their presence in the streets, considering some recommendations previously made by Medina-Mora.
This study did not include extended comments on gender behavior and drug abuse in adolescents according to SNA data. We would like to highlight results from a study that included 3,005 adolescents in Mexico City and identified that 29% had the opportunity to consume drugs. Of these adolescents, 18% who consumed them showed a higher prevalence of males, older adolescents, school drop-outs, or had parents with drug problems. 

Therefore, study authors suggested the lower prevalence of drug abuse by females may be associated with fewer opportunities because, when the opportunities were equal, females consumed drugs with the same frequency as males. Those interested in epidemiological differences between genders in adolescents may use resources reported here.

We should highlight from SNAs that even though they are categorized by states, gender, and rural and urban areas, published information does not show a higher detail on drug abuse during adolescence. As with SEP-INP surveys, it would be convenient to increment the analyzed age range and investigate this phenomenon in children from 7 to 11 years old and adolescents between 12 and 21 years-old. Meanwhile, routine investigation on drug consumption in adolescents should be carried out by general physicians, family physicians and pediatricians, providing patients with information about risks involved with drug abuse.

Also, and perhaps with a different focus, elementary, junior-high, senior-high and university teachers should actively participate in campaigns against drug use. This requires that campaigns are creative and permanent. In order to finance them, resources from state and federal governments are required.

All of the above are as essential as government measures taken against drug trafficking. We hope that in the coming years the illegal drug production will decrease, reducing opportunities for drug use to our school-age children and adolescents. However, it is important to highlight findings from SNA-2008, 1 year after government actions against drug traffic started where demand increased when comparing results with SNA-2006. Consumption of cocaine doubled and consumption of other drugs showed a positive trend: meth-amphetamines, crack and heroine among them.

In conclusion, it would be excellent if this study increases the interest, concern and actions of those who are directly or indirectly involved with the future of our children.

Correspondence to: Dr. Luis Jasso Gutiérrez Departamento de Evaluación y Análisis de Medicamentos Hospital Infantil de México Federico Gómez México D.F., México E-mail: ljasso@himfg.edu.mx Jassogut@prodigy.net.mx

References


